367.38780X00
NC 18213 US

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: HANNUKSELA

Serial No.: 09/619,660

Filed: July 19, 2000

For: VIDEO CODING

Group: 2613

Examiner: Nhon Diep

INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. §1.97 AND §1.98

Commissioner for Patents
P.O. Box 145
Alexandria, VA 22313-1450

May 6, 2004

Sir:

Applicant is submitting herewith for the Examiner's consideration copies of documents cited in a communication from a foreign patent office in a counterpart foreign application. The documents are listed on the attached form equivalent to Form PTO-1449.

This Information Disclosure Statement is being submitted before the mailing date of a first office action on the merits.

Each of the documents listed on the attached form equivalent to Form PTO-1449 is in the English language.

It is respectfully requested that this Information Disclosure Statement be considered by the Examiner in view of the following comments which are an analysis

of the EP 0 844 792 and CA 2 306 791 patents provided by the assignee's European representative.

The digital compressed video signal transmission system disclosed by EP 0 844 792 involves "a transport protocol for arranging hierarchically formatted compressed video data for robust transmission in noisy communication channels and apparatus for realizing the transport protocol" (page 2, lines 45 & 46). The text continues: "The transport protocol presented here defines cells (or packets) of data where each cell includes a Prefix and a Transport Block. In an exemplary embodiment, the Prefix consists of four bits of control information and twelve bits for service channel identification. The Transport Blocks (typically 128 bytes) consist of either Auxiliary data, redundant MPEG Headers, or standard PEG data. Compressed video data is applied to the transport processor, which is responsive to the header data to develop transport block headers and to store particular header data. The transport processor segments the compressed data into data blocks of a predetermined size and appends transport headers thereto to form cells for transmission. The particular stored header data is formatted into a plurality of cells and these cells are interspersed between regularly occurring successive cells oaf compressed data" (page 2, lines 46-54).

From this description, it would be clear to a person skilled in the art that the system disclosed in EP 0 844 792 relates to a transport processor in a packet-based data transmission system that forms compressed video data produced by a video encoder (and possibly other data) into transport packets and adds a certain amount of redundancy (and hence error resilience) by forming additional data packets containing copies of headers relating to the compressed video signal. This means

that the invention disclosed in EP 0 844 792 is: a). specific to packet-based transmission systems and b). operates at a stage after the video signal has already been compressed by the video encoder. This means that copies the headers are not formed as part of the video encoding process itself, but rather they are added later by a transport layer that is responsible for actual transmission of the video data. More specifically, the copies of the headers are added at a stage where that bit stream is divided into packets and possibly assembled with other data (e.g. the Auxiliary data referred to above) ready for transmission.

The text on page 2 of EP 0 844 792 between lines 25 and 32 describes the basic concepts of the MPEG protocol for video encoding. More specifically, it states that: The compression algorithm involves predicting frames of a video signal from prior frames of the video signal and transmitting in compressed form, the difference between actual and predicted frames. Successively encoded frames are dependent on the correctness of prior encoded frames. Only one or a small number of frames in a group of pictures in non-predictively encoded. It should be immediately recognized that, in a receiver, decoding errors due to data loss or corruption during transmission will propagate through successive frames with in a GOP. In order to preclude the propagation of such errors and concomitant image corruption special precautions must be taken. However, such precautions are not included in the MPEG protocol because it was fashioned primarily for noiseless transmission channels." Thus it can be seen that EP 0 844 792 identifies a problem associated with the MPEG video coding protocol (namely its lack of special precautions to limit the propagation of errors due to data loss or corruption). The proposed solution proposed is the use of a transport protocol that adds copies of MPEG headers when

the compressed video data is packetized for transmission. The transport processor described in EP 0 844 792 is separate from the video encoder (see Figure 6) and thus, the solution does not propose changes to the MPEG video encoding protocol itself. Neither does the technical description suggest that any such changes should or could be made. Indeed, it would be well known to a person skilled in the art that video coding protocols, such as the MPEG video coding scheme referred to in EP 0 844 792, are generally defined by international standards. As such, the form of the bit-stream syntax is laid down in the standard and, if modified in an arbitrary manner, would likely result in a modified bit-stream that could not be decoded by a standard-compliant decoder.

In contrast, the invention presented by NC18213 provides copies of picture header data within the bit-stream produced by the video encoder itself. Thus, the present invention takes an approach to providing error resilience that is not taught or suggested by EP 0 844 792. Indeed, it could be said that the passage of text on page 2 from line 25 to line 32 actually teaches away from this approach.

In the exemplary embodiments of the invention, the video encoder is implemented according to ITU-T recommendation H.263 and the mechanisms chosen to provide the repeated picture header data within the video bit-stream are designed so as to be backward compatible with video decoders that do not support the use of such repeated picture header data. The design of such backward-compatible methods certainly requires inventive thought and there is nothing in the disclosure of EP 0 844 792 that would suggest how to design picture header data repletion schemes for a video encoder implemented according to H.263, since the

method proposed there does not affect the actual structure of the encoded video bit-stream produced by the encoder.

It should further be noted that the general approach adopted by the present invention, in which picture header data is repeated within the bit-stream formed by the video encoder itself, has certain technical advantages compared with the solution presented in EP 0 844 792. In particular, the additional error resilience provided by applying the method of the present invention is not reliant on any further processing of the video bit-stream, but is an inherent property of the bit-stream. The method according to the invention may therefore obviate the need for additional processing at the transport protocol layer. This is not the case in the solution presented in EP 0 844 792, where error resilience in the form of repeated MPEG header data is added by a transport processor, a device separate from and following the video encoder in processing order. The solution presented in EP 0 844 792 is also specific to packet-based communication networks. In contrast, the mechanism of the invention can be used irrespective of the type of the underlying transmission network and therefore provides error resilience to video bit-streams intended for transmission over circuit-switched connections as well as packet-switched networks.

As CA 2 306 971 is a granted Canadian patent belonging to the same patent family as EP 0 844 792. All of the above technical arguments apply in equal measure to the teachings of that document as well.

Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli, Terry,

Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 367.38780X00), and please credit any excess fees to such deposit account.

Respectfully submitted,

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Attachments